

XXIX.—*The Mammals of Turkestan.*

By Dr. N. SEVERTZOFF.

[Continued from p. 225.]

Ovis Heinsii, nob.

I have thus named this species, the first specimen having been sent to me by General Heins from Tockmack.

All the three surfaces of the horns are equally concave; the edges, although slightly rounded, are sharp. In the section at the base of the horn the nuchal surface is a little narrower than the orbital surface, and the frontal surface is about once and a half as broad as either of the two former.

The spiral of the horn fits on an inserted cone pointing to the outside; the axis of this cone points backwards with a slight inclination downwards.

The basal chord and the axis of the skull form an angle of 40° , the basal chord and the median form an angle of 31° ; whilst the latter and the terminal chord meet in a right angle, which, however, I believe, is less in very old specimens.

The occipital ridge of the skull is rather elevated. The nasal and orbital processes of the *frontals* are at first united in one broad bone, which reaches down to the anterior rim of the orbit, where the processes separate, the orbital, which is not much smaller than the nasal process, extending over the anterior parts of the orbit.

The nasals are not widened superiorly; their lateral edges are not straight, but rather wavy; the sharpened points extend over half the bone, so that the nostrils are very large, almost two thirds of the whole distance from the anterior rim of the orbit to the free extremities of the præmaxillæ. The profile is convex.

The lachrymals form only the anterior corner of the orbit; of the Wornierian bones the upper one fits into the space between the nasal and orbital processes of the frontal; the middle border is the shortest and the only one bent towards the interior of the orbit, forming a very sharp angle at its point.

In the form of the lachrymal *O. Heinsii* is nearer to *O. Karclini* than any other species of this genus.

The malar forms almost the entire lower and anterior edge of the orbit; its facial portion extends further towards the muzzle than the lachrymal, from which latter it is partly separated by a process of the maxillary; the end of the facial portion forms three rounded processes, of which the middle one is the largest, the others being rather short. The maxillaries

and the nasals are separated from each other by a long narrow bone, whilst the præmaxillæ do not reach quite so far as the nasals, articulating with the maxillaries; this corresponds with the large nostrils, and forms one of the best characters of the present species.

The skulls of these sheep, as stated above, have been found in the Toekmack district; but no further particulars as to the exact place are known, and consequently the exact geographical distribution is uncertain. Some greyish brown sheep seen by me in the Alexandrovsk district near Merke seemed to belong to this species; they were found at an elevation of 8000 feet above the sea-level, also near the rivers Katchara and Chu, where the Kirgies tribes also informed Mr. Semennoff about these sheep; they could hardly be *O. Polii*.

The horns of *O. Heinsii* are not much smaller than those of *O. Polii* of the same age. The skull of a specimen of *O. Heinsii* aged five years measures 11 inches 4 lines, the length of the horns is 33 inches 2 lines, and the extent between the tips is 31 inches 4 lines; whilst the same measurements of *O. Polii* of a corresponding age are 12 inches 6 lines, 37 inches, and 35 inches respectively. I tried to calculate by these figures the size of an adult *O. Heinsii*, judging by the affinity of *O. Polii*, taking also into consideration the different directions of the horns in both species; and the result is the following:—length without the tail about $5\frac{3}{4}$ feet, height at the shoulders $3\frac{1}{2}$ feet; length of the horn 4 feet; the extent between the ends of the horns 37 to 38 inches, or a little over 3 feet.

These are the probable measurements of an adult male of *O. Heinsii*. The species might easily be mistaken by the Kirgies tribes for *O. Polii*.

Ovis nigrimontana.

I have called it by this name because of its having been found at first in the Karatau mountains (which means black mountains, or *nigri montes*).

The frontal surface of the horn is convex, the other two are concave; and in consequence the edges are sharp, in particular the nuchal edge. In the section at the base of the horn, the nuchal and orbital surfaces are almost equal in breadth, each of them being about half as broad again as the frontal surface.

The axis of the skull and the basal chord of the horn form an angle of 38° , the median and basal chords 23° , and the angle formed by the terminal ascending chord of the horn and the axis of the skull is 63° .

The spiral of the horn would fit on an inserted cone with the base pointing towards the skull; the axis of this cone points a little forwards, with a slight inclination downwards.

The ridges on the horns are very sharp, but straight, regular and parallel with each other; the horns do not extend much down the forehead.

The occipital ridge of the skull of an adult male is sharp and very little rounded; the forehead rises very steeply, beginning from the nasals; the first orbital process is narrow and fits in between the two flats of the lachrymal; the nasal process is very long.

The nasals are not so wide where they join the frontals as they are towards their lower extremities; their sharpened point is short.

The nostrils are very small, smaller even than those of *O. Karelini*; and viewed in profile the nostrils extend less than half the distance from the lachrymal to the end of the præmaxillæ. The profile of the nose is almost straight, and becomes a little convex only near its end: with advanced age his prominence of the nose increases; but even in old specimens of *O. nigrimontana* it is not so considerable as it is in young specimens of other species. The flats of the lachrymal are situated along the front edge of the orbit, so that the lowest extends further forward than the upper one. The latter does not reach as far as the centre of the orbit; the middle one is wide and extends to the centre of the orbit.

The malar extends along the whole lower margin of the orbit; it is wide; its facial portion is about the same width as the lachrymal; its anterior border is straight, joining the inferior border at a sharp angle. The zygomatic process of the malar is long and thin, being in its whole length of equal width.

The maxillary is separated by a long narrow bone from the nasal, which does not join the lachrymal as is the case with the other sheep, but is connected with the nasal process of the frontal.

The variations of the skull according to age are unknown; all the three skulls obtained by me belong to specimens of over six years of age, with all the cranial bones ankylosed.

I gave above a description of the colour as far as I could distinguish it.

This species inhabits almost the entire Karatau; it is abundant on the summits of the Buguni, on the rocks near Marnin-saz, and on the western portion of the Teramsk hills, where the numerous steep rocks and ravines near the river Borolday afford good hiding-places to these animals. They

also occur on the summits of the Chayan mountains; further in a north-westerly direction I met with them on the rocks of the Turlansky-Pereval; and, according to the native tribes living there, these sheep are abundant also on the Min-Djelkey, the highest point of the Karatau mountains; and are to be found even at the foot of these mountains, namely in the Kara-murun hills, about 1000 feet high, and the steppes not above 1500 feet above the level of the sea. These latter are covered solely with steppe-plants. In the Karatau they keep close to the grass-covered plains and meadows, sometimes descending to the steppes to feed on the salt plants.

These sheep keep in very small flocks of from three to four individuals; and often single females with a lamb are to be met with, and even single males. This cannot be attributed to the usual habits of this species; but the reason for this scattering is more to be looked for in the very rocky nature of the parts of the Karatau mountains to which this sheep is driven by the different nomad tribes of the Kirgics, with their numerous flocks and herds. This is altogether different from the case of *O. Poliï*, which usually grazes on the large plains of Aksay in very small flocks, although they might easily assemble in flocks consisting of hundreds of individuals, as is done by *O. Karelini* on the plains of the Narin.

O. Poliï being larger and stronger than the other sheep, does not require to form such large flocks as the others do, especially *O. nigrimontana*, which certainly is one of the smallest and weakest of the whole group of the Central-Asiatic sheep. It is also very cautious and shy; and the reason for this is easily found—namely, the way in which it is constantly driven out of its localities.

In localities situated at about 1000 feet altitude, where it is in no danger, this sheep likes to look down from some lofty rock upon what takes place below. This was the case with one which watched for over an hour the arrangement of my tent and bed on the plain of Kaed-mistay in the Karatau; and at another time a sheep watched my passing through the ravine of Buguni. At the same time it very cautiously looks out for danger, and at the slightest suspicion of the approach of such it leaves the place at once.

Ovis aries, var. *steatopyga*.

The tame Kirgics sheep I think ought simply to be called *O. steatopyga* and be taken as a distinct species. The long dependent ears and the fat tails of the Kirgics sheep (characteristics dependent of course on domestication) show the parent stock, to which also the short and irregular horns are referable;

but there are some other characteristics, probably not dependent on domestication, namely the high legs and the short tail, both of which separate this sheep from our tame one and bring it nearer to the wild species just described.

For determining its affinity with the latter, I am sorry to say, I have no good adult skulls here with normal horns; but, as far as I can remember, the horns in their shape, especially in the inner spiral, more resemble those of the above wild sheep than the horns of the Russian or Spanish domestic breeds; the median curve also does not come quite so close to the head.

The inner spiral of the horns of the Spanish sheep (the original variety *infantado*) would fit on a cone with a rather short axis, which points towards the front and forms a very sharp angle with the axis of the skull; owing to the form of the inner spiral the median curves approach the skull below, and do not spread out from it as is the case with all the wild species. The spirals of the ridges of the right horn are turned to the left, and on the left horns to the right, as in all the other *Oves*; but the axil spiral forms one and a half or even two circles round the imaginary cone on which the inner spiral fits, whereas there is usually only one circle in the wild sheep.

The flat forehead is one of the most striking characteristics: it is not vaulted immediately above the nose as in the wild sheep; but this may be dependent upon the small horns and domestication. The forehead is as flat as that of the Kirgies sheep: but the horns of the latter, to the best of my belief, are different; the axis of the cone on which they are turned is not short; and in that respect the Kirgies sheep come nearer to the wild species. These differences, however, most probably sprang from domestication; this is most likely also the reason for the difference in the horns, the rising basal curve being even shorter than that of the Spanish sheep. It also very often happens that the horns are not regularly bent, or the edges are irregular; this, however, is to be seen on small horns only; and often there are even four or six ridges running down to the end of the horn. Hornless sheep are also common and even more numerous than those with horns; and the shorter the horns are, so much the longer are the ears in proportion.

The examination of all these varieties illustrates also the specific distinctions between the different wild sheep. Constant, however, are the high legs and short tail, which are proportionally of the same size as on wild sheep, in which the tail is half as long as the nose of the animal, whilst the tail of our sheep is equal to the length of the whole head.

The "fat tail" consists solely of two pieces of fat hanging down on each side of the tail; this is also the case with some

of the long-tailed races of sheep, which, however, are known to me only from descriptions. The development of these fat tails depends principally upon the salt plants on which the animal feeds; from the want of this food the tail becomes smaller. It is, however, an hereditary character; and even newly born lambs occasionally possess such a tail. The hornless sheep as a rule have also the largest fat tails.

The changes of the tail from the change of food do not take place at once: they can be more easily appreciated on comparing the long-tailed sheep, which feed on salt plants in the country about the Syr-Darja, with the short-tailed Kirgies sheep from Karkara, which hardly ever feed on such herbs. When sheep that had been feeding on salt ground are driven on more nutritious meadows (not quite so salt as the former) they at first begin to get fatter, and only later on the tail commences to grow too. This is regularly done in the Ural and the west of Siberia, where the sheep are principally sold for the sake of the tallow. But if fed on plants without any salt substance in them, the sheep themselves get fatter, but the tail does not grow at all.

The colour of these sheep is very variable; there are white, grey, black, and blackish-brown, or even greyish-brown individuals, these latter being nearest in colour to the wild species. I also noticed that the belly in the dark animals is usually darker than the back, like *Ovis argali*, sometimes of the same colour, but never lighter, like *O. Poli*, *O. Karelini*, or *O. nigrimontana*. At the same time the last-named species is nearest to the tame sheep in an indirect way, viz. by its partial resemblances to and differences from *O. Poli*. In examining the tame sheep of Arabia, Rüppell has recognized their distinction from the European long-tailed sheep, and thought that they originally descended from *O. argali*, having only altered by domestication. A. Brehm, mentioning this supposition of Rüppell's ('Ergebnisse einer Reise nach Habesch'), agrees with him regarding these sheep's specific distinction, but thinks it doubtful that they can be descended from *O. argali*, which differs so much in size from the tame breed. Brehm did not analyze the character or value of these differences as compared with the points of resemblance between the tame sheep and *O. argali*; but the latter are of weight and will prove Rüppell's statement to be correct. Of all the wild sheep, *O. argali* is most certainly the nearest to the tame ones; notwithstanding those characters which it has in common with its wild relatives, it approaches the tame sheep in two very important points, viz. in the shortened chords of the basal curve of the horns and in its colour.

O. argali, like all tame Turkestan sheep, has the belly darker than the back—a peculiarity analogous, to a certain extent, to the black cross bands on the wings of the dovecot pigeon, to which so much importance is attached by Mr. Darwin as proving that the origin of that bird is to be sought in *Columba livia*. Also the horns of *O. argali* are close to the sides of the skull in proportion to their large size, this being the only species of all wild sheep in which this is the case.

Consequently the only difference consists in the larger size of the animal and the proportionally larger horns. Here a suggestive analogy is afforded by *O. nigrimontana*, which in its general appearance and colour partly resembles *O. Poliï*, but is considerably smaller in size, and lives at a much lower elevation. It seems a very reasonable hypothesis that the wild stock of the tame sheep of Turkestan was or is very much like *O. argali*, only of a smaller size and with smaller horns, inhabiting the low mountains of Mongolia, a locality which is so very little known that a species like the one suggested may possibly yet be found there. If not, what is more likely still, it may be taken for granted that this species is extinct in the wild state, in the same way as the original of our long-tailed European sheep is not now to be found.

If the wild sheep, the original of the fat-tailed breed, was nearer to the present tame one than to *O. argali*, its increase in the tame state very likely drove the wild ones from their original grazing-places; and these latter not being admitted by the larger wild sheep into the higher mountains, were gradually exterminated.

It is also probable that the smaller sheep were more easily tamed than the larger and stronger species, and would not only be more suitable for domestication, but, on account of their being more easily captured, they were more pursued by the sportsman, which is another reason for the extinction of this species; the principal cause of this latter, however, was probably the occupation of its feeding-grounds by the tame herds.

But another question arises here—namely, whether *O. argali* as it is now existed at the time when the original stock of the present Kirgias sheep was first tamed; for this domestication would of course have some influence also on the wild breeds.

At the present time the wild sheep are driven out of the meadows which they occupied formerly, and which now are exclusively the pastures of the tame flocks; and many changes in the wild beasts find an explanation in this.

Whilst the tame sheep were undergoing alteration according to the wants of men by means of breeding from selected speci-

mens, the wild ones were also obliged to modify in order to exist, and to avoid being driven altogether away by the tame flocks, which were looked after and watched by men.

O. argali has very coarse hair and soft underwool; the hair of the tame sheep is only moderately coarse; and the southern sheep do not possess any soft underhair at all. The existence of this soft wool is to be regarded as a proof of weakness, and is combined in the tame sheep with a comparatively much greater development of the organs of generation. Consequently it may be supposed that the weakest and smallest sheep were selected for domestication; and as they easily got fat and bred quickest, they would also be more likely to remain in a tame state, whilst the stronger and wilder individuals would be apt to run away. The increased development of fat and the organs of generation may have been caused at first by the quiet life, and then increased by artificial selection. With the wild sheep the opposite would be the case; for contest for the females would favour the development of the horns and muscles rather than that of the reproductive organs. In being driven out of the plains by the tame herds of the nomad tribes, the weaker, smaller, and less agile of the wild sheep would be killed in jumping from rocks and ledges when pursued, especially in trying to leap the ravines, over which the stronger leader of the flock had shown the way; or when they lagged behind the flock they would be killed either by the hunters or by beasts of prey; and in this way, through thousands of years perhaps, the strongest sheep would continue to exist, whilst the weaker ones with smaller horns were killed off. Such might be the explanation of the difference in size between the wild and tame sheep; and it explains also their slower growth and development as well as their less prolificness. This process is not merely hypothetical, but has its proofs in the skulls that are found lying about on the rocks and in the ravines, most of which belong to the weaker adult males.

From the above considerations I am led to agree in Rüppell's opinion, that the fat-tailed sheep and *O. argali* both descend from one original stock, having undergone some changes in opposite directions. The comparison of the wild sheep also shows another characteristic, viz. that they are larger in size and in their horns the higher the localities are which they inhabit; this can be traced from *O. nigrimontana*, through *O. Heinsii* and *O. Karelini*, up to *O. Poliï*. In size the specimens of *O. Karelini* that inhabit the Narin mountains are hardly smaller than *O. Poliï*, judging by the skulls; and the *O. Poliï* from the Aksay are probably the smallest represen-

tatives of this species. Marco Polo talks about some larger sheep from the higher-situated plains at the summits of the mountains at the Kashgar-Darja, and M. Semenov says that the sheep seen by him about Han-tengri were as large as a stag—that is, not less than 7 feet in length, and over 4 feet high at the shoulders.

It is therefore probable that the very nourishing food and the rarefied mountain-air had also some influence in the continual development of the sheep in their size and their horns.

The rarefied and cold mountain-air generally enlarges the proportions; this is not only the case among the mammals but also some birds: for example, *Gyps uivicola* is much larger than *G. fulvus*; also *G. barbatus* grows larger in proportion to the altitude of the locality it inhabits. Of course some circumstance might exist which would interfere with the growth of the sheep—as, for instance, want of food in the high mountains, as in the case of *O. montana* of the Rocky Mountains of North America, which is smaller than *O. argali*, although it inhabits higher localities; but this does not at all disprove my theory as to the influence of the mountain-air on the growth of the sheep; for in Asia the high-elevated hills are never or very seldom covered with snow, and therefore the winter food is abundant, whilst the Rocky Mountains are covered with snow, and in consequence the sheep suffer from want of food.

In conclusion, I will only add that very little further material exists to settle the question regarding the origin of the wild and tame sheep of Central Asia, because of the unfavourable conditions for the preservation of the skulls which are scattered in the mountains.

On the ground these skulls very soon get spoiled: the bones get soaked in the snow, and then again very dry in the summer; and in consequence they soon rot. I found them in all stages of decomposition, and some even with part of the horns fallen off. Complete skulls could only be preserved in some dried-up lake; but, judging from the animals' habits, the skulls are not likely to get there. Therefore it is not at all premature to try and complete as far as possible the evidence of the origin and development of the different species of sheep which exist at the present time.

71. *Capra sibirica*.

Is pretty common in the eastern portion of Turkestan, particularly in the higher regions of the Thian-Shan mountains, where it never descends below 4500 feet above the sea.

72. *Capra aegagrus domestica* (*Hircus*).

Is to be found all over Turkestan in the low hills, ascending in summer, when the weather is mild, to the higher regions.

73. *Capra* (sp.?).

In the south-western portion of Turkestan, in the neighbourhood of Hodgent, also between the Zarevshan and the Syr-Darja, I met with this goat, but only on the highest mountains; and I never observed it below about 6000 feet.

Capra sibirica; *Capra skyn*.

I will postpone the comparison of these two species, which are as yet not sufficiently known, until I obtain more material. At the present time I possess only one skin and a skull of a young female specimen, perhaps of *Capra skyn*. Skulls with very large horns, which were stated to belong to the present species by Wagner (Schreber's *Säugethiere fortgesetzt von A. Wagner*), were brought from Kok-kia near the Aksay. His description is very incomplete, on account of his being in want of specimens; he even does not settle the question whether *Capra skyn* is a separate species or only a variety of *Capra sibirica*. I cannot do this either, because I have not got a young specimen of *Capra sibirica*, nor could I find one either in Moscow or St. Petersburg. I can only state that the colour of my specimen (a young female *Capra skyn*) agrees completely with Wagner's description.

As the sheep are separable into *Ovis* and *Musimon*, the goats also may be divided into three groups, namely *Ibex*, *Capra*, and *Hircus*.

The *Ibex* has no beard; the horns have three sides or surfaces (the nuchal, frontal, and orbital), and also three ridges; the frontal surface of the horn has a rough surface, as, for instance, that of *Ibex alpinus* (*Capra ibex* auct.) of Switzerland.

Capra has similar horns; but both sexes have a beard (*C. sibirica*, *C. skyn*, &c.). *Hircus* has also a beard, but has horns with only two, convex surfaces, the orbital and the interior surface, and only two edges, the frontal and the nuchal; the frontal edge is sharp, and the nuchal edge blunt and rather rounded, such as those of *H. aegagrus* and *H. Falconeri*, which are both relatives of the tame goat.

The Capridæ have a very limited distribution, which is also the case with *Ovis*, *Musimon*, *Ammotragus*, *Ægoceros*, *Ibex*, *Capra*, and *Hircus*—the only exception being *Capra sibirica*

(if *C. skyn* is identical with it), which has a very extended range; but should *C. sibirica* and *C. skyn* form two distinct species, then the localities inhabited by them will be separated by the Narin, as far as can be fixed now; perhaps the limit might also be formed by the plains of Aksay and Chatir-kul. *Ovis argali* was also looked upon as being an exception to the above rule; but, as I showed above, this supposition arose only from the confusion of several of the Central-Asiatic sheep with this species; this is another reason which induces me to believe that *Capra skyn* is distinct from *C. sibirica*.

According to the analogy of the sheep, I suppose that there are even more than two species of *Capra* inhabiting the Thian-Shan; this, however, yet remains to be proved. If we compare the limited range of each species of the Capridæ with the much larger distribution of other mountain-mammals (as, for instance, *Capella rupricapra*, whose range extends from the Pyrenees to the Caucasus, or the *Oreotragus saltator*, which is to be found from the Cape of Good Hope upwards to Abyssinia), we shall find that a limited distribution is not at all a general characteristic of mountain-mammals. Nor is it dependent upon the physical conditions, particularly in the mountains of Central Asia, all of which are situated near to each other; and consequently there must have been another reason for the development of so many different species. This reason is to be found in the change of the life of wild animals from the time when they were driven out from their native localities by the tame flocks. In that way the habitats of wild animals were separated from each other by some valleys or meadows, or even mountain-plains, on which the tame ones were feeding; and this separation of course has favoured the quicker development of the different species.

At the present time the wild mammals live close to the tame cattle, and have adapted themselves to the conditions of their life, and have got into the habit of avoiding and getting away from the danger; and at the same time they have learned to make use of every convenient opportunity for enlarging their feeding-localities. This they could not possibly have learned at once, but in the course of several generations, and is the result of their increase in numbers in the localities to which they were obliged to withdraw. I made the observation on *Ovis tarda*, that it leaves at once those steppes in which cultivation has commenced, and withdraws to such as are yet uninhabited; but the increase in their numbers on the latter compels them to go back again to the localities they had left, and in consequence thereof to alter their habits. The same may also have been the case with the wild Capridæ.

Now, for instance, between the localities inhabited by *Ovis Poli*i and *O. Karelini* there is a narrow line where the two species are both to be met with, namely near the Upper Narin: at the same place I think it possible that also *Capra skyn* and *C. sibirica* meet; it is, however, only during the last twenty years that those two species have inhabited that locality, as it is only about that time since the Kirgies left it with their tame flocks, to the wild sheep and goats. I must also add that *C. sibirica* is distributed over the range of two species of sheep, namely *Ovis argali* and *O. Karelini*, which might be in connexion with their respective avoidance of mankind, as is the case on the Kora (see above).

The goat is not so partial to the mountain-meadows; and as it climbs more and is altogether a more truly alpine animal, it has not been driven away into the mountains to the same extent as the sheep. Besides, the herds of tame goats are not nearly so considerable as those of sheep in Central Asia.

I may here remark that the range of *Capella rupicapra* is restricted now to four localities—namely the Pyrenees, the Alps, the Carpathians, and the Caucasus. Four different species have not arisen, however, as only the Alpine chamois can be distinguished from the one inhabiting the Pyrenees. Probably the reason of this is that the characters of the genus *Capella* are less liable to change than those of the sheep or goats, the latter lying mostly in the proportions of the horns and skull, and being much more marked in the males than in the females.

74. *Bos taurus*.

Is found at all seasons all over Turkestan, and at almost every elevation, only being met in summer above 7000 feet, descending lower down for the cold season.

75. *Bos indicus*.

Inhabits the south-western portion of Turkestan, including the Zarevshan valley, but does not go high into the mountains.

76. *Bos grunniens (domesticus)*.

Is found all over the eastern half of Turkestan, comprising the basins of the rivers Narin, Chu-Talas, &c. It never or very seldom descends below 6000 feet, and in summer goes even to the summits of the mountains; it does not stop there, however, during the winter.

[To be continued.]